

IN THE CLAIMS:

1.-22. (Cancelled).

23. (New) An apparatus for carrying out a heterogeneously catalyzed reaction, comprising:

at least one pair of alternating first and second catalyst layers;

the first catalyst layer comprising

an educt opening passing therethrough, and

(b)  
an educt channel formed in a planar surface of the first catalyst layer and fluidly connected to the educt opening; and

the second catalyst layer comprising

a product opening passing therethrough,

a product channel formed in a planar surface of the second catalyst layer and fluidly connected to the product opening;

the first and second catalyst layers further comprising a substantially gas-tight edge seal in a peripheral region thereof.

24. (New) The apparatus of Claim 23, wherein the first catalyst layer comprises first and second educt openings and a plurality of educt channels fluidly connected to at least one of the first and second educt openings, and the second catalyst layer comprises first and second product openings therein and a plurality of product channels fluidly connected to at least one of the first and second product openings.

25. (New) An apparatus for carrying out a heterogeneously catalyzed reaction, comprising:

a stack comprising a plurality of porous catalyst layers, each of the catalyst layers comprising

an educt opening passing therethrough,

an educt channel formed in a planar surface of the catalyst layer and fluidly connected to the educt opening,

a product opening therethrough, and

a substantially gas-tight edge seal in a peripheral region of the catalyst layer.

26. (New) The apparatus of Claim 25, wherein the catalyst layers further comprise a product channel formed in the planar surface thereof, the fluid channel fluidly connected to the product opening.

27. (New) The apparatus of Claim 25, wherein the catalyst layers further comprise first and second educt openings, a first plurality of educt channels fluidly connected to the first educt opening, and a second plurality of educt channels fluidly connected to the second educt opening, wherein the first and second educt channels are interdigitated.

28. (New) The apparatus of Claim 25, further comprising first and second end plates, the first end plate sealingly connected to a first catalyst layer of the stack and the second end plate sealingly connected to a last catalyst layer.

29. (New) The apparatus of Claim 28, further comprising a gas-tight sheet material covering the surface of the stack between the first and second end plates.

30. (New) The apparatus of Claim 29, wherein the sheet material comprises at least one vent hole therein.

31. (New) The apparatus of Claim 25, wherein the catalyst layer further comprises a mixture comprising a metallic support structure and catalyst particles.

32. (New) The apparatus of Claim 31, wherein the metallic support structure comprises dendritic copper.

33. (New) A method of making a porous catalyst layer for carrying out a heterogeneously catalyzed reaction, the method comprising:

(b)

placing catalyst particles in a mold;

compressing the catalyst particles to form a consolidated layer;

forming at least one educt or product channel in a surface of the consolidated layer; and

sealing a peripheral edge region of the consolidated layer to form a substantially gas-tight edge seal.

34. (New) The method of Claim 33, further comprising sintering the consolidated layer.

35. (New) The method of Claim 33, further comprising placing a mixture comprising the catalyst particles in the mold, and compressing the mixture to form the consolidated layer.

36. (New) The method of Claim 35, wherein the mixture further comprises a metallic support structure.

37. (New) The method of Claim 36, wherein the metallic support structure comprises dendritic copper.

38. (New) The method of Claim 36, wherein the mixture in the edge region further comprises a sealing material and compressing the mixture forms the edge seal.

39. (New) The method of Claim 36, wherein the mixture in the edge region further comprises a sealing material, the method further comprising sintering the consolidated layer.

40. (New) The method of Claim 33, wherein edge seal is formed by compressing the edge region to consolidate it.

41. (New) A method of making an apparatus for carrying out a heterogeneously catalyzed reaction, comprising:

forming a plurality of catalyst layers, each such catalyst layer formed by placing a mixture comprising catalyst particles in a mold, compressing the mixture to form a consolidated layer, and forming at least one educt or product channel in a surface of the consolidated layer;

stacking the catalyst layers to form a stack; and

sealing a peripheral edge region of the plurality of catalyst layers to form a substantially gas-tight edge seal.

42. (New) The method of Claim 41, further comprising sintering the stack.

43. (New) The method of Claim 41, wherein the edge seal is formed by applying a sealing material to the surface of the stack.

44. (New) The method of Claim 43, wherein the sealing material comprises copper or ceramic.

45. (New) The method of Claim 43, wherein the technique for applying the sealing material to the stack is selected from the group consisting of immersion, plasma spraying and flame spraying.

46. (New) The method of Claim 43, wherein the sealing material comprises soldering foil, the method further comprising heating the foil so that it penetrates into the stack.

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47. (New) The method of Claim 41, further comprising sealingly attaching first and second end plates to opposing porous surfaces of the stack, wherein the end plates and edge seal cooperate to make the stack substantially gas-tight.

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(Applicant's Remarks are set forth hereinbelow, starting on the following page.)